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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,187	02/25/2004	Ping-Hsu Chen	67,200-1070	3693

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TUNG & ASSOCIATES
Suite 120
838 W. Long Lake Road
Bloomfield Hills, MI 48302

EXAMINER

NOVACEK, CHRISTY L

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 04/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/786,187

Applicant(s)

CHEN ET AL

Examiner

Christy L. Novacek

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

This office action is in response to the request for continued examination filed March 29, 2006 and the amendment filed February 21, 2006.

Response to Amendment

The amendment of claim 1 is sufficient to overcome the objection to claim 1 stated in the office action mailed November 14, 2005. Therefore, this objection is withdrawn.

The limitations added to claims 1, 9 and 16 are sufficient to overcome the rejections of claims 1, 9 and 16 as being anticipated by Livengood et al. (US 5,952,247), the rejections of claims 2, 5, 10, 13, 17 and 19 unpatentable over Livengood et al. in view of Mizumura et al. (US 5,825,035), the rejections of claims 3, 11 and 18 as being unpatentable over Livengood et al. in view of Lee et al. (US 6,251,782), the rejections of claims 4, 7, 8, 12 and 15 as being unpatentable over Livengood et al. in view of Lee et al. and Mizumura et al., and the rejections of claims 6, 14 and 20 as being unpatentable over Livengood et al. in view of Mizumura et al. and Lee et al. Therefore, these rejections are withdrawn.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1, 2, 5, 9, 10, 13, 16, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in view of Miller (US 20040099638).

Regarding claim 1, the admitted prior art recited in Applicant's specification describes a conventional integrated circuit structure including a substrate (12) with alignment marks (16) and

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at least one opaque layer (18/22) overlaying the alignment marks (paragraphs 0002, 0010). The admitted prior art recites that it is conventional to re-expose the alignment marks through an upper surface of the substrate by using photolithography to etch away the opaque layer overlaying the alignment marks (paragraph 0011). The admitted prior art does not disclose using a focused ion beam to remove the overlaying opaque layer. Like the admitted prior art, Miller discloses a conventional integrated circuit structure including a substrate having alignment marks that are covered with various layers of opaque metallization (para. 0008-0010, 0026-0033). Miller teaches that uncovering the opaque metallization layers by photolithography, as is done in the admitted prior art, is **disadvantageous**, stating:

“This process of uncovering or cleaning the alignment marks is typically accomplished with additional photolithography steps. However, the additional mask and etch steps, plus the attendant cleaning and inspection steps, undesirably increase cycle time and process complexity. As shown in the table below, uncovering an alignment mark using a traditional photolithography process can delay further processing of a wafer up to 8 hours, while uncovering an alignment mark using the present invention may only take a total of approximately 0.25 hours.” (para. 0026).

Miller teaches that, instead of using the conventional photolithography method to uncover the alignment marks, it is better to use a focused ion beam to obliterate the opaque metallization layers overlaying the alignment marks, because the focused ion beam method does not employ the numerous steps required by the photolithography method, thus uncovering the alignment marks can proceed at a much faster rate than was previously possible (para. 0026, 0033-0034). At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the focused ion beam method of Miller to re-expose the alignment marks of the admitted prior art because Miller teaches that the focused ion beam method does not employ the

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numerous steps required by the photolithography method, thus uncovering the alignment marks can proceed at a much faster rate than was previously possible.

Regarding claims 2, 10 and 17, Miller discloses that the focused ion beam has a noble gas source (para. 0034).

Regarding claims 5, 13 and 19, Miller discloses that the focused ion beam has a noble gas source of argon (para. 0034).

Regarding claim 9, the admitted prior art recited in Applicant's specification describes a conventional integrated circuit structure including a substrate (12) with alignment marks (16), at least one transparent dielectric layer (14) overlaying the alignment marks, and at least one opaque layer (18/22) overlaying the transparent dielectric layer (paragraphs 0002, 0010). The admitted prior art recites that it is conventional to re-expose the alignment marks through an upper surface of the substrate by using photolithography to etch away the opaque layer overlaying the alignment marks, leaving the transparent layer intact over the alignment marks (paragraph 0011). The admitted prior art does not disclose using a focused ion beam to remove the overlaying opaque layer. Like the admitted prior art, Miller discloses a conventional integrated circuit structure including a substrate having alignment marks that are covered with various layers of opaque metallization (para. 0008-0010, 0026-0033). Miller teaches that, instead of using the conventional photolithography method to uncover the alignment marks, it is better to use a focused ion beam to obliterate the opaque metallization layers overlaying the alignment marks, because the focused ion beam method does not employ the numerous steps required by the photolithography method, thus uncovering the alignment marks can proceed at a much faster rate than was previously possible (para. 0026, 0033-0034). At the time of the

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invention, it would have been obvious to one of ordinary skill in the art to use the focused ion beam method of Miller to re-expose the alignment marks of the admitted prior art because Miller teaches that the focused ion beam method does not employ the numerous steps required by the photolithography method, thus uncovering the alignment marks can proceed at a much faster rate than was previously possible.

Regarding claim 16, the admitted prior art recited in Applicant's specification describes a conventional integrated circuit structure including a substrate (12) with alignment marks (16), a transparent dielectric layer (14) overlaying the alignment marks, and at least one opaque layer (18/22) overlaying the transparent dielectric layer (paragraphs 0002, 0010). The admitted prior art recites that it is conventional to re-expose the alignment marks through an upper surface of the substrate by using photolithography to etch away the opaque layer overlaying the alignment marks, leaving the transparent layer intact over the alignment marks and viewing the alignment marks through the exposure opening and the dielectric layer (paragraph 0011). The admitted prior art does not disclose using a focused ion beam to remove the overlaying opaque layer. Like the admitted prior art, Miller discloses a conventional integrated circuit structure including a substrate having alignment marks that are covered with various layers of opaque metallization (para. 0008-0010, 0026-0033). Miller teaches that, instead of using the conventional photolithography method to uncover the alignment marks, it is better to use a focused ion beam to obliterate the opaque metallization layers overlaying the alignment marks, because the focused ion beam method does not employ the numerous steps required by the photolithography method, thus uncovering the alignment marks can proceed at a much faster rate than was previously possible (para. 0026, 0033-0034). At the time of the invention, it would have been obvious to

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one of ordinary skill in the art to use the focused ion beam method of Miller to re-expose the alignment marks of the admitted prior art because Miller teaches that the focused ion beam method does not employ the numerous steps required by the photolithography method, thus uncovering the alignment marks can proceed at a much faster rate than was previously possible.

Claims 3, 4, 6-8, 11, 12, 14, 15, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in view of Miller (US 20040099638) as applied to claims 2, 5, 9, 13, 16 and 19 above, and further in view of Lee et al. (US 6,251,782, previously cited).

Regarding claims 3, 6, 8, 11, 14, 18 and 20, Miller does not disclose using a current density of 200-800 pA to etch the opaque layer. Lee discloses that a FIB system having a current density of 672 pA can successfully etch through opaque material (col. 6, ln. 19-33). At the time of the invention, it would have been obvious to one of ordinary skill in the art to FIB etch the opaque layers of Miller using a current density of 672 pA because Lee teaches that a current density of 672 pA can successfully etch an opaque layer.

Regarding claims 4 and 12, Miller discloses that the focused ion beam has a noble gas source (para. 0034).

Regarding claims 7 and 15, Miller discloses that the focused ion beam has a noble gas source of argon (para. 0034).

Response to Arguments

Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

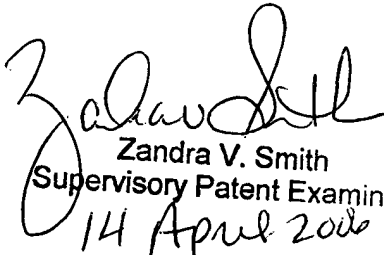
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (571) 272-1839. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLN
April 12, 2006


Zandra V. Smith
Supervisory Patent Examiner
14 April 2006